POLICY RESEARCH WORKING PAPER 2948

The Impact of Contractual Savings Institutions on Securities Markets

Gregorio Impavido
Alberto R. Musalem
Thierry Tressel

The World Bank
Financial Sector Operations and Policy Department
January 2003

POLICY RESEARCH WORKING PAPER 2948

Abstract

Impavido, Musalem, and Tressel assess empirically the impact of contractual savings institutions portfolios (pension funds and life insurance companies) on securities markets, for example, depth and liquidity in the domestic stock market, and depth in the domestic bond market. They discuss how the institutionalization of savings can modify financial markets through the lengthening of securities' maturities.

The results are the following:

- An increase in assets of contractual savings institutions relative to domestic financial assets has a positive impact on the depth of stock and bond markets on average.
- The impact on stock market depth and liquidity is nonlinear: it is stronger in countries where corporate information is more transparent.
- There is evidence of a significant heterogeneity among countries: contractual savings have a stronger impact on securities markets in countries where the financial system is market based, pension fund contributions are mandatory, and international transactions in securities are lower.
- The authors do not find that the impact of contractual savings institutions on securities markets is explained by the overall level of development, education, demographic structure or the legal environment.

This paper—a product of the Financial Sector Operations and Policy Department—is part of a larger effort in the department to study the effects of contractual savings on financial markets. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Patricia Braxton, room MC9-904, telephone 202-473-2720, fax 202-522-7105, email address pbraxton@worldbank.org. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at gimpavido@worldbank.org, amusalem@worldbank.org, or ttressel@imf.org. January 2003. (27 pages)

The Impact Of Contractual Savings Institutions On Securities Markets

Gregorio Impavido, Alberto R. Musalem and Thierry Tressel[†]

JEL Classification Codes: G18, G22, G23.
Keywords: Institutional investors, stock markets, bond markets.

[†] Gregorio Impavido (gimpavido@worldbank.org) and Alberto Roque Musalem (amusalem@worldbank.org) are respectively Senior Financial Economist and Lead Economist at the World Bank. Thierry Tressel (ttressel@imf.org) is Economist at the IMF.

We are grateful to Patrick Honohan for valuable comments on an earlier draft.

INTRODUCTION

Contractual savings institutions (pension funds and life insurance companies) and financial markets have been growing at fast rates in many OECD (as in France, The United Kingdom and the United States) and non OECD countries (such as Chile and South Africa) over the past 10-15 years. The institutionalization of savings by pension funds and life insurance companies is bound to develop in the future as demographic trends push for reforming pension systems in many countries, from unfunded to funded pension systems.[1]

Although the primary function of these institutions is to provide sufficient, sustainable and affordable benefits for old age, recent work suggests that the spillovers on the financial system are significant (see Catalan, Impavido and Musalem (2000) and Impavido and Musalem (2000)), thus modifying firms' and banks' financing patterns (Impavido, Musalem and Tressel (2002a and 2002b)) by increasing the maturity of their liabilities.

The aim of this paper is to complement this recent work by focusing on several aspects linking contractual savings institutions to securities markets that have not yet been investigated. The underlying motivation is to understand whether the development of contractual savings leads to the development of securities markets, and which factors magnify or dampen this impact.

We address the following questions: under which circumstances is the development of contractual savings likely to have a stronger impact on securities markets? To what extent do underlying factors, including the level of economic development, the legal environment, the demographic trends, *et cetera*, determine the short-run dynamics of contractual savings development within and across countries? Once controlled for such slow-moving factors, that are likely to impact both contractual savings and domestic securities markets, do contractual savings institutions have an impact on domestic securities markets?

We focus on the short-term dynamics of stock market depth and liquidity, and bond market depth[2] and our results are summarized in the following points:

- First, after controlling for several sources of bias that may affect the correlation between financial market variables and the development of contractual savings,

[1] Poterba and Samwick (1995) provide empirical evidence of institutionalization of savings in the US. They notice how the principal postwar trend in ownership has been a decline in stock owned by households directly and an increase in ownership through various financial intermediaries. Bossone *et al.* (2002), provide preliminary empirical results on how the development of financial infrastructure plays a key role in promoting non-bank financial intermediation. They also provide an explanation for why traditional banking predominates in the early stages of economic development, while non-bank financial intermediation predominates in more advanced stages of development. Hence, generalizing the argument that may seem to be limited here only to the effect related to the promotion of pensions and life insurance schemes.

[2] Markets depth and liquidity are defined as market capitalization and value traded relative to GDP, respectively. Bond market capitalization is the value of bonds outstanding (the aggregate of public and private bonds).

we find that the institutionalization of savings leads to the deepening of stock and bond markets.

- Next, there is evidence of substantial heterogeneity across countries. First, the development of contractual savings is associated with an increase in stock market capitalization relative to GDP in countries that structurally rely more on stock market finance; it is associated with an increase in bond market capitalization relative to GDP in countries that structurally rely more on bank finance. Second, contractual savings development leads to an increase in stock market capitalization and stock market value traded relative to GDP in countries in which pension contributions are mandatory, while these two effects are less clear in countries in which pension contributions are voluntary. The impact on market value traded is found not to be significantly different from zero when we consider the complete set of countries in our dataset. Third, the impact on stock market capitalization relative to GDP is significant when cross-border transactions in securities are not too large. Finally, structural features of the securities market, such as transparency also matters: the impact of contractual savings is greater in countries with better accounting standards
- Finally, our results suggest that the impact of contractual savings on the short-term dynamics of securities markets is not explained by other structural characteristics of the economies in our sample, such as the overall level of development, openness to trade, the legal environment and the demographic structure. We interpret this result as evidence that policy decisions that shape the evolution of contractual savings institutions do matter and that the impact of contractual savings on securities markets is not due solely to slow-moving country characteristics.

The paper is organized as follows. Section I summarizes the mechanisms through which contractual savings institutions affect domestic securities markets. In Section II, we describe the empirical model and the strategy chosen for the rest of the paper. Results reported in the appendix are presented in Section III. Conclusions follow in Section IV.

I Interaction between Contractual Savings Institutions and Financial Markets

In this section, we discuss how the development of contractual savings institutions might affect the functioning of financial markets. A more detailed discussion of this topic can be found in Catalan, Impavido and Musalem (2000), Blommestein (2001), Blommestein and Funke (1998), Davis and Steil (2001), Impavido and Musalem (2000), Impavido, Musalem and Tressel (2002a and 2002b), Reisen (2000), and Vittas (1999).

First, the development of contractual savings institutions provides an institutional framework favoring the accumulation of long-term capital.[3] By increasing the demand for long-term financial assets, it could thus promote financial market development, and

[3] For instance, the existence of transaction costs on capital markets, the ability to diversify risk, and the long-term commitments of contractual savings institutions explain why they may be more willing to hold long-term securities than individual investors, and require lower risk and liquidity premia.

improve the capacity to manage financial risks. Second, contractual savings institutions may compete with investment banks, leading to more efficient primary markets. Third, given their need for asset management, their development is likely to enhance financial innovation and modernization of trading systems. Fourth, they play a major role in enhancing market discipline, for instance by stimulating transparency on securities markets, they have the ability to actively promote the interests of minority shareholders of the firms in which they invest. Next, such institutionalization of savings may deepen the public debt market, and progressively help to build the yield curve, thus stimulating the private debt and other financial instrument markets.

The supply of securities by the private and public sector may in turn be affected, as the costs of raising funds on stock and bond markets decreases.

As argued by Vittas (1999 and 2002), preconditions for the development of contractual savings, and particularly a pension reform, are less stringent than expected if a gradual approach is chosen. Impavido, Musalem and Vittas (2002) provide an analytical framework for countries with a small financial system. They include sound macroeconomic policies, the existence of a core of efficient and sound banking and insurance institutions, and a lasting commitment for the creation of an effective regulatory and supervisory agency and reform of the capital markets. The long-term commitment of governments is particularly crucial, as a volatile macroeconomic environment would undermine the development of contractual savings; fiscal policy must be prudent: "as long as the levels of nominal debt are too high, long term maturities are not attainable as the credibility of the anti-inflationary stance of the government is undermined."[45]

The impact of contractual savings institutions on capital markets may depend on various factors.

First, as argued by Vittas (1999), it may not materialize until a "critical" mass of savings has been mobilized. Second, the impact on the aggregate supply of long-term savings may depend on the potential modifications of households' portfolios. When pension contributions are voluntary and mostly realized by wealthy households, the development of contractual savings may be partly offset by a decrease in other long-term savings instruments. Conversely, mandatory contributions may have a greater impact on the supply of long-term savings when households would not save long-term spontaneously.[6] The asset allocation of pension funds and life insurance is also likely to affect the way capital markets develop. This may be shaped by features of financial systems that are more structured as, for instance, the relative importance of bank and

[4] Quoted from Impavido, Musalem and Vittas (2002).

[5] Similarly, the use of contractual savings funds as a captive source of finance by governments may signal a lack of commitment to sound macro-economic policies, thus undermining the development of domestic financial markets.

[6] Baillu and Reisen (1998) explain how aggregate savings can increase when credit constrained borrowers (indeed, likely to be the poorer individuals) would not be able to re-shuffle their investment portfolios when mandated to save through a pension scheme beyond what they would do for precautionary motives. Indeed, the literature provides us with ambiguous results on the impact on household savings derived from the introduction of mandatory schemes. Following the literature, the impact on securities markets that we want to underline in this paper does not stem necessarily from higher savings but from a more efficient allocation of capital due to institutionalization.

stock market finance in the economy. Next, whether contractual savings development stimulate further the demand for securities – and in turn its supply by lowering issuance costs – will depend on the supervisory and regulatory mechanisms, fostered by transparent accounting practices, among other factors. Finally, the development of contractual savings institutions may have an indirect impact on domestic financial markets. For instance it may signal to foreign investors a sound and stable domestic financial system, hence leading to significant cross-border transactions of securities.[7] On the contrary, the development of domestic financial markets is less stimulated when contractual savings invest a larger proportion of their funds abroad.[8] Overall, there is a variety of reasons why one would expect to observe substantial heterogeneity across countries experiences, as indeed it is observed.

II Model Specification and Empirical Strategy

II.A The Model

We consider a model in which investors choose to invest in stocks, bonds, money (currency and non-remunerated deposits) and quasi-money (e.g. remunerated bank deposits). At the end of each period $t-1$, each investor submits a demand for each type of financial asset for the next period t. Individual demands d_t are aggregated in demand functions D_t for each type of asset. We assume that the supply for each type of financial asset is fixed.[9] Individuals have rational expectations and their demand functions depend on a set of factors including institutional characteristics and expected prices. Formally, the demand for each type of asset is given by:

$$\begin{cases} D_t = F_t\left(Z_{t-1}, E_{t-1}(P_t), E_{t-1}(\Sigma_t)\right) \\ E_{t-1}(P_t) = P_{t-1} \\ E_{t-1}(\Sigma_t) = \Sigma_{t-1} \end{cases} \quad (1)$$

where P_t and Σ_t are vectors including, respectively, rates of returns and measures of risks of financial assets (stocks, bonds, quasi-money, and non-interest bearing money). Agents use current returns and risks to forecast future returns and risks. Z_{t-1} is a vector including institutional characteristics that affect the financial market, such as the development of contractual savings institutions. If the variables considered have a causal effect on financial markets, it is natural to include them with one or several lags and we use only one lag in our estimations because of the short time dimension of our panels. GDP per capita is used as a proxy for other institutional aspects that are presumably strongly correlated with the level of development. Finally, if contractual savings exerts a

[7] For instance, pension funds hardly invest in stocks in Switzerland, Malaysia and Singapore, all countries with large contractual savings and stock markets.

[8] Although restricting the foreign investments of contractual savings for the sole purpose of stimulating the domestic financial system is likely to be counter-productive: see Impavido, Musalem and Vittas (2002) for a discussion.

[9] This is a reasonable assumption if the supply varies less than the demand in the short-run.

causal impact on the depth of securities markets, it is again natural to include the variable with lags and in order to maximize the size of the sample, we use only one year lag.

In our regressions we focus on the demand for stocks and bonds, which we estimate in separate equations.

Given the panel structure of our data, we use a GMM dynamic panel estimator that corrects for endogeneity of explanatory variables, time-specific effects and unobserved country-specific effects (in which time invariant institutional factors other that GDP/capita and contractual savings are included). In each equation we included the lag dependent variable to allow for endogenous persistence (of stock market capitalization, stock market liquidity or bond market capitalization). In turn, this implies that our analysis is focused on the short-term dynamics of financial markets. The empirical specification is the following:

$$Y_{it} = \alpha Y_{it-1} + \beta' P_{it-1} + \varphi' \Sigma_{it-1} + \phi' Z_{it-1} + f_i + d_t + \varepsilon_{it} \qquad (2)$$

where Y_{it} is either stock market capitalization relative to GDP, stock market value traded relative to GDP or bond market capitalization relative to GDP; P_{it} is a vector including the real returns on stocks, debt and non-interest bearing money; Σ_{it} is a vector including the risk measures for the three types of financial assets; Z_{it} includes observed institutional features such as the relative size of contractual savings and the level of economic development; f_i captures all unobserved country-specific fixed effects and all country-specific time-invariant variables; d_t is a full set of year dummies; ε_{it} is the error term which is assumed not to be correlated across countries and not auto-correlated.

We use the Arellano and Bond (1991) difference GMM estimator[10] which amounts to implementing the following steps. First, the equation is first-differenced in order to eliminate the country-specific fixed effect (which is likely to be correlated with the explanatory variables):

$$\Delta Y_{it} = \alpha \Delta Y_{it-1} + \beta' \Delta P_{it-1} + \varphi' \Delta \Sigma_{it-1} + \phi' \Delta Z_{it-1} + \Delta d_t + \Delta \varepsilon_{it} \qquad (3)$$

Next, instruments are used in order to deal with the likely endogeneity of explanatory variables and non-orthogonality between error term and regressors in (3).[11] Assuming that the error term in (2) is not serially correlated, the following moment conditions apply to the lag dependent variable and the set of explanatory Y_{it} variables $X = (P, \Sigma, Z)$:

[10] We do not use the GMM system estimator developed by Arellano and Bover (1995) for the following reason. Moment conditions for the system estimator are based on the assumption that lags of the first difference of the dependent variable and explanatory variables are uncorrelated with the fixed effects f_i. In the context of our paper, this means that changes in securities markets' depth and liquidity, and changes in contractual savings size are uncorrelated with slow-moving country specific factors, such as past policy choices (notably the decision to develop a funded pension system, with mandatory or voluntary contributions prior to the period studied), demographic structures, etc. This is obviously incompatible with the argument and results of the paper.

[11] Results confirm that the assumption of no serial correlation of error terms in the level equation is valid.

$$E[Y_{i,t-s} \cdot (\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2$$

$$E[X_{i,t-s} \cdot (\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2$$

We present only first step estimates, corrected for heteroschedasticity, which are reported by Arellano and Bond (1991) to be the most reliable.[12]

II.B Data and Definition of Variables

II.B.1 Data

The data on contractual savings institutions used in this paper has been already used in earlier papers by the same authors. It includes information from different sources[13] on total financial assets, and allocation of assets for a subset of countries. Other macroeconomic variables are obtained from various sources: Datastream for stock market index, the World Development Indicators, the IMF International Financial Statistics, the Bank for International Settlement for bond markets data, and various papers (Demirguc-Kunt and Levine (1999) and La Porta *et al.* (1996)).

II.B.2 Definition of Variables

We want to assess the impact of contractual savings institutions portfolios' on securities market depth and liquidity. We consider the following dependent variables: a) stock market depth is proxied by stock market capitalization over GDP, b) stock market liquidity is proxied by stock value traded over GDP, c) bond market depth is defined as the value of total bonds outstanding (public and private) over GDP. All financial variables are measured at the end of the year.

We control for real rates of returns and risks for three groups of assets. First, the real rate of return on non-interest bearing money is defined by: {[1/(1+inflation rate)] – 1}. Second, the real rate of return on quasi money is proxied by the real interest rate on deposits[14] and defined by : {[(1+ iD)/(1+inflation rate)]-1}. Third, the real rate of return on stocks uses the annual rate of growth of earnings for the Datastream index and defined by: {[(1+rate of change of the stock price index +dividends)/(1+inflation rate)]-1}. Fourth, the risk measure is computed, for each real rate of return, as the ratio of the within year standard deviation to the mean of the real rate of return considered.[15]

We also control for GDP per capita, defined in constant dollar, as a proxy for the overall level of development of the country considered.

---

[12] The one-step estimator produces consistent standard errors, but does not yield heteroschedasticity-consistent coefficients when the dependent variable does not follow an AR(1) process with a close to unity coefficient. In our regressions we correct for heteroschedasticity.

[13] Including data from the OECD Institutional Investors Statistical Yearbook 2000 for OECD countries, and national sources for other countries.

[14] The nominal deposit interest rate was chosen as the variable larger country coverage. As shown in Table 3, this choice yields a negative (albeit very small) average real interest rate in countries like Austria and Ireland; and a rather high negative average real interest in Turkey.

[15] Computed from monthly data.

The aim is to assess whether the institutionalization of savings has an impact on the development of domestic securities market.

Testing for economic causality is not an easy task in a panel data framework in which the time dimension is short (6 years per country on average). In particular, one could argue that the long-run dynamics of economies, that includes stock markets, bond markets and contractual savings institutions, are all determined by other, slow moving, factors such as the legal framework, the overall level of development, the level of education, the demographic structure, *et cetera*.

The different results presented and the methodology chosen in this paper suggest that such long-term joint determination of both financial markets and contractual savings institutions may not explain the strong correlation between the short-term dynamics of financial markets and contractual savings institutions over the 1990s.

Several sources of bias are controlled for.

As already explained, the choice of using the lag contractual savings variable rather than the contemporaneous one is natural if contractual savings are to have a causal impact on the dynamics of stock and bond markets.

Next, the GMM procedure allows to control for the fact that the size of contractual savings is likely to be correlated to the error term that captures country-year specific shocks affecting stock or bond markets.

The correlation between contractual savings and securities market development may simply be the consequence of price movements. As contractual savings' financial assets are measured at their market values, there exists *a priori* a strong correlation between the stock and bond market variables and contractual savings financial assets. Hence, contractual savings financial assets over GDP may not be an appropriate variable. Note that we do want to explain stock and bond markets depth (e.g., variables in nominal terms scaled by GDP). In particular, we do want to analyze whether the development of contractual savings leads to an increase in the demand for securities (hence their prices[16]) relative to GDP. Thus, this price effect has to be embodied in the dependent variable. However, the econometric relationship between the development of contractual savings and financial markets depth and liquidity should not be the result of such a price effect. For this purpose, we define contractual savings as the share of contractual savings financial assets over total financial assets (i.e., stock market capitalization plus the value of total bond outstanding plus M2). This variable captures the importance of institutional savings relative to total financial assets in the economy.[17]

The definition of the variables used in the paper can be found in Table 1.

[16] Thus we are implicitly assuming that the supply of securities does not change significantly relative to the demand.

[17] Note that the impact of price movements on the correlation between the dependent variable and the contractual savings variable is not obvious. If the asset composition of contractual savings is similar to the economy portfolio, then price changes will not affect the independent variable but will affect the dependent variable. If stocks have a higher weight in contractual savings than in the economy portfolio then a price increase will increase both independent as well as dependent variables, so we get a positive result. Finally, if stocks have a lower weight in contractual savings than in the economy portfolio then a price increase will lower the independent variable but will increase the dependent variable.

III Empirical Results

III.A Descriptive Statistics

Table 2 provides a classification of countries used in our regressions according to several dummies indicating whether countries have bank or market based financial systems, high or low capital account openness, and voluntary or mandatory pension systems.[18]

Table 3 presents the sample of countries that are included in the first general regression in Table 6. It includes developed OECD countries and also several emerging economies (e.g. Argentina, Chile, Hungary, Malaysia, Poland, South Africa and Turkey). We use the information of total financial assets held by contractual savings in these economies.[19] In the econometric analysis, we have on average 6 consecutive years of observation per country.

As described in previous papers,[20] contractual savings financial assets have increased at a rapid pace in many countries over the 90s. Contractual savings financial assets, relative to GDP, have been growing at an average annual rate of 17.7%, 3.4%, 6.9%, 6%, 7.9% and 9%, respectively in France, Germany, South Africa, the United States, the United Kingdom and Chile. Expressed relative to total financial assets in the economy, the respective average annual rates of growth are 13.5%, -1.0%, 8.9%, 1.8%, 1.7% and 3.5%. A shown by Impavido and Musalem (2000), this development has been similar, in term of growth, to the development of capital markets, and may partly explain this evolution. Stock market capitalization (relative to GDP) has been growing for the same countries respectively at 3.3%, 8.0%, 8.9%, 10.1%, 5.9% and 3.6% annually on average, and bond market capitalization (relative to GDP) respectively at 3.1%, 3.6%, -8.0%, 2.4%, 5.5% and 8%. Stock markets have become more liquid in all countries, except Germany: stock value traded (relative to GDP) has been growing for France, Germany, South Africa, the United States, the United Kingdom and Chile respectively at 12.9%, -0.1%, 20.7%, 16.6%, 6.8% and 15.1% annually on average.

Statistics based solely on the cross-country dimension give a similar flavor. In countries with the highest proportion of financial assets held by contractual savings[21] (44.4% of total financial assets on average over the period), stock market capitalization, stock value traded and bond market capitalization are respectively on average 125.7%, 64.0% and 43.7% of GDP. In countries with the lowest proportion of financial assets held by contractual savings[22] (5.7% of total financial assets on average over the period), the same figures are 22.2%, 63.4% and 14.5%, respectively. Hence, financial assets held by contractual savings seem to explain relatively well the cross-country differences of

[18] The index of voluntary or mandatory pension systems is constructed using OECD (2002).

[19] For Argentina, we use only financial assets held by pension funds. Dropping these two countries, or including financial assets held by the insurance industry (we do not have the break up between life and non-life insurance), does not affect the results. For Poland, we have only the information for life insurance; dropping the country does not affect the result.

[20] See for instance Impavido and Musalem (2000) and Impavido, Musalem and Tressel (2002a and 2002b).

[21] Countries are: Iceland, Ireland, Netherlands, Singapore, South Africa, Switzerland and the United Kingdom.

[22] Greece, Hungary, Italy, Mexico, Portugal, Spain and Turkey.

stock market capitalization and liquidity, while they seem to be less correlated with bond market capitalization in our data.[23]

Table 4 and Table 5 report simple correlations between various variables based on the sample of the first general regression in Table 6. CSFA is indeed positively correlated with stock market capitalization and stock value traded, at a 5% significance level, while the positive correlation with bond market capitalization is not significant. As expected, CSFA is significantly larger in more developed economies. Furthermore, volatility on stock market returns is significantly lower when contractual savings are more developed, which suggests that contractual savings development may be associated with a less volatile environment for investors. Stock market returns are also more volatile in more inflationary environments, which is consistent with the view that higher inflation may be associated with higher economic uncertainty. Finally, there does not seem to be a significant correlation, on a cross country basis, between the size of contractual savings and whether pension contributions are mandatory or voluntary, and also the importance of capital account transactions in securities.

These simple statistics suggest that there is a close relationship between the proportion of financial assets held by contractual savings and the depth and liquidity of financial markets. The econometric analysis in the next section further studies the impact of contractual savings development on financial markets.

III.B Regression Results

Table 6 reports regression results for a) domestic stock market capitalization, b) domestic stock value traded, and c) domestic bond market capitalization. The GMM estimator that we use, in the context of a dynamic panel, implies that our focus is on the short-term dynamic of the dependent variable. In each equation, there is a strong persistence of the dependent variable as shown by the strongly significant coefficient on its lag value. Tests on the residuals support the specification and instruments chosen, as they imply that they are not serially correlated[24]. The results support the hypothesis that the increased importance of contractual savings, as a proportion of total financial assets, is associated with an increase in stock market capitalization and an increase in bond market capitalization. The impact is economically large in both cases. For instance, it implies that a 1% point increase in the share of contractual savings in total financial assets leads to 1.89% point increase in stock market capitalization (relative to GDP, which proxies for real income) at the next period, after controlling for various factors – including current stock market capitalization. However, there does not seem to be an impact on stock market liquidity, proxied by stock value traded,[25] when countries are not differentiated.[26]

[23] The statistics reported are calculated over the sample used in the first regression of Table 6.

[24] In addition, the Sargan test does not reject the over-identification restrictions at the 5% level. We report Sargan tests based on the first step estimates. Note that Arellano and Bond (1991) show that the Sargan test based on the first step estimates understates the probability of accepting the over-identification restriction in presence of heteroschedasticity.

[25] We performed the same analysis with the turnover ratio (stock value traded over stock market capitalization) instead of stock value traded over GDP. The results are broadly similar. However, the assumption of no serial correlation in the residual was systematically rejected, and as we did not obtain a satisfactory specification, we chose not to report these regressions.

Control variables are mildly significant. The coefficient on inflation is usually positive and at least weakly significant in all the specifications in the stock market capitalization and stock value traded regressions. This is because an acceleration in inflation promotes a flight from nominal financial assets (e.g., non-interest bearing money) into real financial assets (stocks). Other studies tend to find a negative impact of inflation on stock market development (for instance Boyd, Levine and Smith (2001)); however, they usually do not include a measure of inflation volatility; as these two variables tend to be strongly correlated (e.g., volatility is higher for higher levels of inflation), this may explain our contrasting results.[27] As expected, the index of stock market real return is positively associated with both stock market dependent variables. Inflation volatility has a negative impact on stock market depth but not on stock market liquidity. Per capita GDP is rarely significant.[28] Bond market depth is positively associated with the real interest rate and the real interest rate volatility variables. While the effect of the real interest rate is intuitive, the impact of volatility of the real interest rate seems counter-intuitive. The volatility of the short term real interest rate should (in principle) be negatively related to demand. However, a plausible explanation for this seemingly contradictory result relates to the demand for different bond maturities, adjustable interest rates or indexed instruments that investors have. In fact, volatility of the short term real interest rate is likely to promote the demand for long term instruments immune to short term volatility: namely, adjustable rate and indexed bonds. Unfortunately, we do not have (both) the long term (and short term interest) rate and we cannot distinguish among the demands for different maturities along the yield curve and immune instruments. We have shown that stock market and bond market capitalization significantly increase following an increase in contractual savings financial assets as a proportion of total financial assets.

However, it is likely that the impact of contractual savings may differ according to various structural characteristics of the economies (such as the relative importance of banks versus stock markets, as shown in Impavido, Musalem and Tressel (2002a)). In the next part of the paper, we explore possible sources of heterogeneity across countries. Table 2 provides the break-up of the countries according to each characteristic considered.

In Table 7 we explore whether the economy has a bank-based or market-based financial system (see the classification defined by Demirguc-Kunt and Levine (1999)) modifies the mechanisms through which contractual savings affect the financial system. As shown in Impavido, Musalem and Tressel (2002a), the asset allocation of contractual savings is noticeably different in the two groups of countries: in market based economies, contractual savings institutions hold 30.7% of their financial assets in equity, 42.6% of bills and bonds and 13.9% in loans; in bank-based economies, the same figures are respectively 12.3%, 45% and 31.6%. The institutionalization of savings by pension funds and life insurance companies is also more developed in market-based economies, in

[26] In interpreting the magnitude of the impact on securities markets we are of course aware of the limitations imposed by the assumption of slope homogeneity.

[27] Boyd, Levine and Smith (2001) analyze in detail the impact of inflation on the financial system. In particular, they find a non-monotonic effect on inflation.

[28] This implies only that the level of development does not explain the *short-run* dynamic of the financial system.

which financial assets held by contractual savings represents 27% of total financial assets versus 19% in bank-based economies.[29]

As suggested by these figures, the development of contractual savings institutions has a significant impact on the development of the stock market only in countries with a market-based financial system. In contrast, the development of contractual savings seems to stimulate the bond market more in countries with a bank-based financial system. These results are consistent with those obtained in Impavido, Musalem and Tressel (2002a) concerning firms' financing patterns.

In Table 8, countries are grouped according to whether pension funds contributions are mandatory or voluntary. In several countries, both systems coexist; for this reason, we defined two classifications by allocating these countries in one of the two sub-groups, so that we obtain the two extreme classifications.

There are two reasons for using this feature of pension funds to classify the countries. The first reason is that we expect that when contributions are voluntary, households may simply substitute different savings instruments with similar maturities (including securities), according to the expected after tax returns. This would be the case for relatively wealthy households[30]. Conversely, when contributions are mandatory, it is more likely that less wealthy households will be forced to hold more long-term savings than they would otherwise do. Hence, the aggregate supply of long-term savings is likely to increase by a larger amount in countries with mandatory pension contributions than in countries with voluntary pension contributions when contractual savings develop because the reallocation of households portfolios to balance their pension contributions will be more limited.[31] The second reason is that the use of this classification is likely to reduce the possible reverse causality and endogeneity problem. When pension contributions are mandatory, it is less likely that an increase in contractual savings size is only due to realized (or expected) increases in stock market returns. More generally, the decision to design a pension fund system with mandatory or voluntary contributions is a political decision that is relatively exogenous to the economic environment.

Interestingly, we find strong support for the hypothesis that contractual savings development has a significant impact on stock market depth and liquidity in economies in which pension contributions are mandatory while it is weaker in countries in which contributions are voluntary. These results are consistent with a causal effect from contractual savings development to stock market development. We do not obtain any clear results for the bond market.

In Table 9 we control for international transactions in securities. Countries are grouped according to the importance of transactions in securities either realized abroad by domestic investors or realized domestically by foreign investors (see Table 1 for the precise definition of the variable). Ideally, we would like to control for two separate issues. First, foreign investors do buy and sell domestic securities. The development of contractual savings may indirectly stimulate the development of domestic financial markets by signaling a sound financial system, hence attracting foreign capital. Second,

[29] The statistics just reported are drawn from the full sample at our disposition.
[30] For instance because of fixed transaction costs to buy/sell securities.
[31] See Baillu and Reisen (1998) for a similar argument.

contractual savings do invest abroad, hence their impact on the domestic financial system may be reduced. These two mechanisms are likely to work in opposite directions: in the first case, one expects that the impact of contractual savings on financial market development is stronger when international transactions are higher. In the second case, the impact of contractual savings on the domestic financial system will be weaker the more they invest abroad. Unfortunately, we do not have enough information to identify each mechanism precisely.

The contractual savings variable is interacted with a dummy variable for each country subgroup, and the variable for capital account openness is also included. Note that this variable is significant only in the stock market capitalization equation; the stock market is larger in countries that are more open to capital flows (at least for securities); this result is more consistent with the first mechanism. However, the interaction term with the contractual savings variable yields mixed results. The impact on market depth is significant only for the stock market capitalization when capital flows are relatively low, while the opposite result in terms of openness is obtained for bond market capitalization. This could be expected given the discussion above.

Table 10 uses a different approach to tackle country heterogeneity. The contractual savings variable is interacted with an index for the quality of accounting standard, a proxy for the transparency on the securities market supposedly positively related to market corporate governance mechanisms.[32] The regressions results support the view that contractual savings institutions may foster the development of stock markets by increasing transparency: the impact on the development of the stock market is indeed higher in countries where accounting standards are well developed, as indeed such an environment is necessary for contractual savings to be able to enhance transparency and market governance mechanisms[33].

In Table 11, we want to make a first step in addressing the causality issue. One of the challenges of empirical economics in the context of panel data with short time series is to disentangle the causality between two variables X and Y. The question is: does X cause Y, or vice-versa, or are X and Y jointly determined by exogenous "initial conditions" that generate the whole path of development of the economic system considered? More specifically, the question here is whether the development of contractual savings has a causal impact on financial markets, or whether financial markets and contractual savings institutions are both symptoms of a better functioning financial system and economy in general. In the former case, a significantly different from zero coefficient in front of the lag contractual savings would indicate causality from contractual savings yesterday to market development today. In the latter case, the lag contractual savings variable might have a positive and significant impact on financial markets simply because of their joint determination.

[32] See La Porta *et al.* (1996).

[33] Notice that in Table 10 we use as regressors both the lag contractual savings variable and the interaction of the contractual savings variable with an index for the quality of accounting standard. Contrary to other tables in which the contractual savings variable is interacted with dummies, the exercise here is to test whether the impact of contractual savings on the dependent variable increases (decreases) with the quality of accounting standards. By keeping the lag of contractual savings in the regression we assume an intercept different from zero in this linear relationship.

First, note that the GMM technique that we use shall in principle correct for various sources of bias, such as endogeneity (that would for instance result from a joint determination of both contractual savings and financial markets variables), and measurement errors. Second, the common factors that may jointly determine our dependent and explanatory variable are likely to be slow-moving factors (e.g. factors that perform better at explaining cross-country differences than at explaining within country evolution over the short or medium term; for instance: education, legal factors, openness to trade, demographic structure, *et cetera*. Hence, it may be difficult to test for their impact on the dynamics of the dependent variables (and also the contractual savings variable). One possibility is to include such slow-moving factors in the *differenced* equation, hence testing whether their *level* has an impact on the *differenced* dependent variable. We performed such a test for the following variables: accounting standards, law origin (common law, civil law), secondary education, rate of growth of population and trade openness. They turned out to be non-significant and do not affect the results substantially, so we do not report these regressions.[34]

The next step is to decompose the contractual savings variable into an "endogenous" component explained by the set of variables capturing the country characteristics (e.g., a fitted value of a regression of the contractual savings variable on this set of slow-moving factors + lag dependent variable), and an "exogenous" component (e.g. the difference between the variable and the fitted value). Using the same estimation technique (difference GMM), we regress the contractual savings variable on the following lag explanatory variables (plus the lag contractual savings variable): a) percentage of population aged more than 64 years, b) rate of growth of population, c) secondary education, d) trade openness, e) rate of growth of per capita GDP, f) per capita GDP, and g) legal indicators + accounting standards + ownership concentration variable[35].[36]

The two components are then used as explanatory variables in the three regressions. Note that the "exogenous" component includes both country time-invariants effects[37] and the residuals that are not serially correlated,[38] but could have different variance, across countries. This component picks up all that is not predicted by the explanatory variables. To us, it means that it embodies the aspects of the dynamics of contractual savings caused by other variables, that are truly exogenous to the structure of the economy, such as the existence (or not) of tax incentives (as in France for life insurance), whether pension contributions are mandatory or voluntary, the decision to undertake a pension reform or not, the regulations affecting the allocation of assets, in short all discretionary policies[39] that favor (or not) the institutionalization of savings.[40] This is a preliminary assessment. However, the results support the view that this "exogenous" component has an impact on

[34] Our understanding is that the effect of such slow-moving factors are probably picked up by the lag dependent variable.

[35] The ownership concentration variable is from La Porta et al. (1996). It is computed as the average percentage of common shares owned by the three largest shareholders in the ten largest non-financial domestic firms.

[36] These last variables are included in levels in the differenced equation.

[37] As they are not estimated in the differenced equation.

[38] The tests indeed reject the presence of serial correlation of the residuals in (3).

[39] In the sense that they truly depend on an exogenous political decision.

[40] See Vittas (2002) for policies that promote retirement savings.

the dynamics of stock and bond markets capitalization, while there is no impact on stock market liquidity.

IV Conclusion

We have explored the impact of contractual savings institutions on the development of domestic securities markets. This work complements the existing research on this issue. We show that the institutionalization of savings, as measured by the proportion of financial assets in the economy held by contractual savings institutions, has an impact on the short-term dynamics of securities markets: it increases the depth of stock and bond markets and in some cases increases the stock market liquidity. The impact on the stock market is stronger in countries with a market based financial system and/or countries with mandatory pension contributions, while the impact on the bond market is stronger in countries with a bank based financial system. The link between contractual savings and stock market is however weaker the larger the cross-border securities transactions are. Next, the use of transparent market-based corporate governance mechanisms tend to complement the impact of contractual savings on the stock market. Finally, the analysis suggests that the results are not the consequence of a joint determination of both contractual savings institutions and financial markets by other slow-moving characteristics of the economies. Policies shaping the institutionalization of savings do matter.

References

[1] Arellano, M., and S. Bond (1991) Some Tests of Specifications for Panel Data: Monte Carlo Evidence and an Application to Employment Equations, *Review of Economic Studies*, 58, p.227-297.

[2] Arellano, M. and O. Bover (1995) Another Look at the Instrumental Variable Estimation of Error-Component Models, *Journal of Econometrics*, 68, 29-52.

[3] Baillu, J., and H. Reisen (1998) Do funded pensions contribute to higher aggregate savings? A cross country analysis. Ageing Working Paper AWP 5.1. Paris: OECD.

[4] Beck, T., and R. Levine (2002) Stock Markets, Banks, and Growth: Panel Evidence. *NBER Working Paper* 9082.

[5] Blommestein, H. (2001) Ageing, Pension Reform, and Financial Market Implications in the OECD Area. *CeRP Working Paper* 9/01.

[6] Blommestein, H., and N. Funke (eds.) (1998) *Institutional Investors in the New Financial Landscape*. (OECD, Paris).

[7] Blundell, R., and S. Bond (1998) Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. *Journal of Econometrics* 87: 115-43.

[8] Bossone, B., Mahajan S., and F. Zahir (2002) Financial Infrastructure, Group Interests, and Capital Accumulation. *IMF Staff Working Paper*. Forthcoming.

[9] Boyd, J. H., Ross L., and Smith, B. D. (2001) The impact of inflation on financial sector performance. *Journal of Monetary Economics*, April, 47(2), 221-248.

[10] **Catalan, M., Impavido G., and A. R. Musalem** (2000) Contractual Savings or Stock Market Development: Which Leads? *Journal of Applied Social Science Studies*, 120(3): 445-87. Paper can also be downloaded from the World Bank Pension Primer Series at http://www.worldbank.org/pensions

[11] **Davis, P., and B. Steil** (2001) *Institutional Investors*. (Cambridge, Mass. : MIT Press, 2001).

[12] **Demirguc-Kunt, A., and R. Levine** (1999) Bank-based and Market-Based Financial Systems: Cross-Country Comparisons, *World Bank Policy Research Paper* 2143.

[13] **Impavido, G., and A.R. Musalem** (2000) Contractual Savings, Stock and Asset Markets, *World Bank Policy Research Paper* 2490.

[14] **Impavido, G., Musalem, A.R., and D. Vittas** (2002) Contractual Savings in Countries with a Small Financial System. In James Hanson, Patrick Honohan, and Giovanni Majnoni eds.: *Globalization and Financial Systems in Small Developing Countries*, (World Bank).

[15] **Impavido, G., Musalem, A.R., and T. Tressel** (2002a) Contractual Savings, Capital Markets, and Firms' Financing Choices, In Devarajan S. and F. H. Rogers eds.: *World Bank Economist' Forum*. Volume II. (World Bank).

[16] **Impavido, G., Musalem, A.R., and T. Tressel** (2002b) Contractual Savings Institutions and Banks' Stability and Efficiency, *World Bank Policy Research Paper* 2751.

[17] **La Porta, R., Lopez-de-Silanes, F., Shleifer, A., and R. Vishny** (1996) Law and Finance". *NBER Working Paper* 5661.

[18] **Levine, R.** (1999) Banks, Markets, and Structure: Implications and Determinants" in Burki, Shahid Javed; Perry, Guillermo E., eds.: *Banks and capital markets: Sound Financial Systems for the 21st century*. Annual World Bank Conference on Development in Latin America and the Caribbean.

[19] **OECD** (2002) Revised Taxonomy for Pension Plans, Pension Funds an Pension Entities. Working Party on Private Pensions DAFFE/AS/PEN/WD(2001)5/REV3.

[20] **Poterba, J. M., and A. A. Samwick** (1995) Stock Ownership Patterns, Stock Market Fluctuations, and Consumptions. *Brookings Papers on Economic Activity*, 2.

[21] **Reisen, H.** (2000) *Pensions, Savings And Capital Flow*. Edward Elgar Publishing

[22] **Vittas, D.** (1999) Pension Reform and Financial Markets, *Harvard Institute for International Development, Development Discussion Paper* 697.

[23] **Vittas, D.** (2002) Policies to Promote Saving for Retirement – A Synthetic Overview, *World Bank Policy Research Paper* 2801.

APPENDIX A

Table 1: Definition of Variables

VARIABLE	DEFINITION
Contractual Savings Financial Assets Share	Pension funds + life insurance financial assets over stock market capitalization plus total bond outstanding plus M2 /1
Stock Market Depth	Stock market capitalization over GDP /1
Stock Market Liquidity	Stock value traded over GDP
Bond Market Depth	Total bond outstanding over GDP /1
Inflation Rate	Consumer price annual inflation rate
Real Interest Rate	(1+nominal interest rate)/(1+inflation rate)-1
Real Rate of Return on Stock Market	(1+rate of change of the stock price index+dividends)/(1+inflation rate)]-1
Inflation Rate Volatility	Standard deviation over mean (inflation) computed from monthly data
Real Interest Rate Volatility	Standard deviation over mean (real interest rate) computed from monthly data
Real Stock Market Return Volatility	Standard deviation over mean (real return index) computed from monthly data
GDP/capita	GDP in constant dollar over total population
BANK	Bank-based financial systems, source Demirguc-Kunt and Levine (1999)
MKT	Market-based financial systems, source Demirguc-Kunt and Levine (1999)
Mandat	Mandatory pension contributions
Volunt	Voluntary pension contributions
Capital Account Portfolio Openness	Sum of absolute value of Portfolio Foreign Investment Assets (IFS line 78bfd) plus Portfolio Foreign Investment Liabilities (IFS line 78 bgd) over GDP
High	Countries with Capital Account Portfolio Openness > median
Low	Countries with Capital Account Portfolio Openness < median
Accounting Standard	Index of accounting practises source. La Porta, Lopez de Silanes & Vishny (1998)

Notes: /1 At the end of the year.

Table 2: Sample Classification

Country	Bank based	Market based	Mandatory1	Voluntary1	Mandatory2	Voluntary2	High Foreign Sec.	Low Foreign Sec.
Argentina	1	0	1	0	1	0	1	0
Australia	0	1	1	0	0	1	1	0
Austria	1	0	0	1	0	1	0	1
Belgium	1	0	0	1	0	1	0	1
Canada	0	1	0	1	0	1	1	0
Chile	0	1	1	0	1	0	0	1
Denmark	0	1	1	0	0	1	1	0
Finland	1	0	0	1	0	1	1	0
France	1	0	0	1	0	1	1	0
Germany	1	0	0	1	0	1	1	0
Greece	1	0	0	1	0	1	0	1
Hungary	1	0	1	0	0	1	0	1
Iceland	0	1	1	0	0	1	0	1
Ireland	1	0	0	1	0	1	1	0
Italy	1	0	0	1	0	1	1	0
Japan	1	0	1	0	0	1	1	0
Korea, Rep.	0	1	0	1	0	1	0	1
Malaysia	0	1	1	0	1	0	0	1
Mexico	0	1	1	0	1	0	0	1
Netherlands	0	1	0	1	0	1	1	0
New Zealand	1	0	0	1	0	1	0	1
Norway	1	0	0	1	0	1	1	0
Poland	1	0	1	0	0	1	0	1
Portugal	1	0	0	1	0	1	1	0
Singapore	0	1	1	0	1	0	0	1
South Africa	0	1	0	1	0	1	0	1
Spain	1	0	0	1	0	1	0	1
Sweden	0	1	1	0	0	1	0	1
Switzerland	0	1	0	1	0	1	1	0
Turkey	0	1	0	1	0	1	0	1
United Kingdom	0	1	0	1	0	1	1	0
United States	0	1	0	1	0	1	1	0

Note: As far as the mandatory and voluntary classifications are concerned, countries are grouped according to whether pension funds contributions are mandatory or voluntary. In several countries, both systems coexist; for this reason, we defined two other indicators by allocating these countries in one of the two sub-groups, so that we obtain the two extreme classifications.

Table 3: In-Sample Country Means of Select Variables

Country	CSFA %	Bond Mkt % GDP	Stock Mkt % GDP	Stock Trd % GDP	Inflation %	Real Int. rate %	Real Mkt Return %
Argentina	3.87	8.45	16.59	4.69	1.35	7.28	14 97
Australia	29.83	47.02	84.87	35.24	3.21	4.42	12.11
Austria	11.00	60.69	14.80	7.77	2.77	-0.17	0.62
Belgium	8.97	156.75	39.47	6.43	2.42	2.53	8.21
Canada	28.77	85.93	63.42	31.19	2.41	4.19	11.70
Chile	25.17	44.85	103.39	10.37	11.87	3.91	29.25
Danmark	19.31	160.03	35.24	15.94	2.10	3.08	11.94
Finland	27.47	60.90	33.82	12.83	2.35	2 35	21.94
France	14.37	78.19	35.26	18.09	2.21	2.02	9.06
Germany	13.16	79.23	27.81	28.78	2.89	1.74	13.53
Greece	8.68	75.34	18.52	7.57	11.67	5.23	2.08
Ireland	46.95	43.28	17.32	6.58	2.51	-2.03	27.92
Italy	4.64	127.56	18.79	9.05	4.45	1.97	12.81
Korea, Rep.	18.90	43.85	33.98	45.88	6.12	3.00	-8.65
Malaysia	15.36	70.70	225.99	118.44	3.82	3.09	26.16
Netherlands	56.75	73.54	78.02	46.70	2.54	1.02	17.26
New Zealand	12.21	26.79	140.13	38.17	1.73	6.04	127.64
Norway	22.51	43.03	28 02	14.61	2.48	4.09	15.15
Poland	1.75	18.42	8.95	5.88	18.03	1.43	24.94
Portugal	6.84	54.69	22.32	8.57	5.01	3.67	22.17
Singapore	36.31	58.87	152.95	72.49	2.46	1.00	3.63
South Africa	37.05	76.57	164.33	15.25	10.85	3.38	6.76
Spain	8.63	57.34	33.40	25.17	4.76	3 28	17.52
Sweden	17.99	109.72	70.37	37.01	4.06	1.78	16.63
Switzerland	35.37	76.05	125.87	92.33	3.16	1.25	12.80
Turkey	0.28	11.98	16.42	17.44	77.86	-3.78	34.87
United Kingdom	46.37	50.18	122.87	45.54	4.01	1.98	11.71
United States	28.31	147.04	94.14	68.30	3.29	1.80	15.64

Notes: Averages are calculated over the sample used in the first regression in Table 6. /1 Pension funds only; /2 Life insurance only.

Table 4: In-Sample Correlation 1

	Contr Savings Size	Market Based	Bank Based	Volunt1	Volunt2	Mandat1	Mandat2	Low Int. Securities	High Int. Securities
Contr. Savings Size	1.0000								
Market Based	0.5527* *0.0000*	1.0000							
Bank Based	-0.5527* *0.0000*	-1.0000* *0.0000*	1.0000						
Volunt1	-0.2223* *0.0051*	-0.2965* *0.0000*	0.2965* *0.0000*	1.0000					
Volunt2	-0.2743* *0.0005*	-0.1111 *0.1332*	0.1111 *0.1332*	0.7131* *0.0000*	1.0000				
Mandat1	0.0361 *0.6536*	0.3822* *0 0000*	-0 3822* *0.0000*	-0.7925* *0.0000*	-0.3560* *0.0000*	1.0000			
Mandat2	0.0674 *0.4018*	0.2181* *0.0029*	-0.2181* *0.0029*	-0.4986* *0.0000*	-0.6992* *0.0000*	0.6292* *0.0000*	1 0000		
Low Int. Securities	-0.2664* *0.0007*	0.2052* *0.0052*	-0.2052* *0.0052*	-0.0438 *0.5553*	0.0012 *0.9869*	0.1508* *0.0410*	0.1367 *0.0642*	1.0000	
High Int. Securities	0.3140* *0.0001*	-0.0802 *0.2790*	0.0802 *0.2790*	0.0384 *0.6050*	0.0783 *0.2908*	-0.1953* *0.0079*	-0.3055* *0 0000*	-0.7673* *0.0000*	1.0000

Notes: Statistics calculated over sample used in the first regression in Table 6. P-values in italics. * = 5% significance level.

Table 5: In-Sample Correlation 2

	Contr. Savings Size	Domestic Bond Size	Stock Market Cap.	Stock Traded	Inflation	Real Interest Rate	Real Stock Market Return	Inflation (volatility)	Real Interest Rate (volatility)	Real Stock Market Return (volatility)	Per Capita GDP
Contr. Savings Size	1.0000										
Domestic Bond Size	-0.0387 *0.6304*	1.0000									
Stock Market Cap.	0 5134* *0 0000*	-0 0018 *0 9820*	1.0000								
Stock Traded	0 3125* *0 0001*	0 0261 *0 7428*	0.7381* *0 0000*	1.0000							
Inflation	-0 3333* *0 0000*	-0.3627* *0 0000*	-0.1686* *0 0326*	-0.1242 *0 1166*	1 0000						
Real Interest Rate	0.0366 *0 6492*	0.0133 *0 8674*	0.0094 *0 9054*	-0.1460 *0 0646*	-0.5129* *0 0000*	1.0000					
Real Stock Market Return	-0.0748 *0 3536*	-0.0411 *0 6056*	0.1346 *0 0898*	0.1338 *0 0915*	0.0406 *0 6099*	0.0057 *0 9333*	1.0000				
Inflation (volatility)	0.0182 *0 8209*	0.0275 *0 7290*	0.0706 *0 3732*	0.1112 *0 1603*	-0.0715 *0 3676*	0.0442 *0.5775*	0.0045 *0 9516*	1.0000			
Real Interest Rate (volatility)	-0.0007 *0 9927*	0 0837 *0 2914*	0.0200 *0 8008*	0.0905 *0 2538*	0 0167 *0 8333*	-0.0931 *0 2403*	0 0517 *0 4869*	0.0047 *0 9494*	1 0000		
Real Stock Market Return (volatility)	-0 3014* *0 0001*	-0 2913* *0 0002*	-0 0886 *0 2635*	0.0472 *0 5521*	0.4898* *0 0000*	-0.1794* *0 0227*	0.4426* *0 0000*	-0.0887 *0 2312*	0.0198 *0 7900*	1.0000	
Per Capita GDP	0.2859* *0 0003*	0.4194* *0 0000*	-0.0441 *0 5783*	0.1932* *0 0141*	-0.3803* *0 0000*	-0.1099 *0 1651*	-0 0356 *0 6545*	0 0824 *0 2985*	0.1282 *0 1052*	-0.1821* *0 0208*	1.0000

Notes: Statistics calculated over sample used in the first regression in Table 6. P-values in italics. * = 5% significance level.

Table 6: Impact of Contractual Savings on Capital Markets

First difference dynamic panel data GMM estimator

Dependent Variable:	Stock Market Capitalization (% GDP)	Stock Traded (% GDP)	Total Domestic Bonds (% GDP)
Explanatory Variables (lagged)			
Lagged dependent variable	0 74 ***	0 63***	0.62 ***
	7.45	*4.5*	*3 68*
CS financial assets share	1.89 ***	0.36	0.40***
	2 41	*0 42*	*2.91*
Inflation	0.6	0.53*	-0.04
	1 24	*1 67*	*-0 27*
Real Interest Rate	-0.52	-0 82	0 48
	-0 55	*-1 13*	*1.59*
Real Return on Stock Market Index	0.13*	0.13*	-0.01034
	1 73	*1 85*	*-0 39*
Inflation (volatility)	-0 035***	-0.002	-8 7E-05
	-4.26	*-0 39*	*-0 05*
Real Interest Rate (volatility)	1.19E-05	0 004	0 0019**
	0	*1 46*	*2.18*
Real Stock Market Return (volatility)	-1.39**	-0 78	0 29
	-1.93	*-1 48*	*1 4*
GDP/capita (constant US $)	7.32E-06	2.71E-06	-4.09E-06
	1 19	*0 49*	*-1.45*
Number of Obs.	161	160	161
Number of Groups	28	28	28
Wald Test (joint significance)	2922.12 15	1729.27 15	341.02 15
Test of autocorrelation of order 1	-2.3	-1 69	-2.62
	0 021	*0 090*	*0 009*
Test of autocorrelation of order 2	0.03	-1.33	-0.07
	0 979	*0 183*	*0 942*
Sargan Test	149.39 (126)	144.79 (133)	149.82 (127)
	0 08	*0 22*	*0 08*

One-step estimates are reported
Standard errors are corrected for heteroschedasticity
Year dummies are included

Notes: * = 10% significance level. ** = 5% significance level. *** = 1% significance level.

Table 7: Impact of Contractual Savings on Capital Markets

(Bank Based / Market Based)

First difference dynamic panel data GMM estimator

Dependent Variable:		Stock Market Capitalization (% GDP)	Stock Traded (% GDP)	Total Domestic Bonds (% GDP)
Explanatory Variables (lagged)				
Lagged dependent variable		0.72***	0.62***	0.56***
		7.25	*4.72*	*3.27*
CS financial assets share	BANK	-0.47	-1.36	1.07***
		-0.49	*-1.54*	*2.98*
	MKT	2.21***	0.71	0.34***
		2.69	*0.78*	*2.26*
Inflation		0.69	0.61*	-0.07
		1.44	*1.66*	*-0.57*
Real Interest Rate		-0.05	-0.4	0.35
		-0.05	*-0.58*	*1.1*
Real Return on Stock Market Index		0.14*	0.14*	-0.009
		1.78	*1.82*	*-0.36*
Inflation (volatility)		-0.03***	-0.0002	-0.001
		-3.79	*-0.03*	*-0.63*
Real Interest Rate (volatility)		-0.0004	0.004	0.002**
		-0.14	*1.33*	*2.04*
Real Stock Market Return (volatility)		-1.35*	-0.72473	0.26
		-1.88	*-1.44*	*1.25*
GDP/capita (constant US $)		9.08E-06	5.06E-06	-4.9E-6*
		1.5	*0.82*	*-1.69*
Number of Obs.		161	160	161
Number of Groups		28	28	28
Wald Test (joint significance)		3281.54 16	1918.27 16	367.82 16
Test of autocorrelation of order 1		-2.23	-1.65	-2.57
		0.026	*0.098*	*0.010*
Test of autocorrelation of order 2		-0.05	-1.33	0.13
		0.961	*0.184*	*0.894*
Sargan Test		149.82 (127)	144.29 (134)	45.43 (36)
		0.08	*0.26*	*0.13*

One-step estimates are reported.
Standard errors are corrected for heteroschedasticity.
Year dummies are included.

Notes: * = 10% significance level. ** = 5% significance level. *** = 1% significance level.

Table 8: Impact of Contractual Savings on Capital Markets

(Voluntary / Mandatory Pension Systems)

First difference dynamic panel data GMM estimator

Dependent Variable:		Stock Market Capitalization (% GDP)		Stock Traded (% GDP)		Total Domestic Bonds (% GDP)	
Explanatory Variables (lagged)							
Lagged dependent variable		0.79***	0 79***	0.67***	0.69***	0.61***	0.62***
		7 85	*7 52*	*4 88*	*4.98*	*4 13*	*3 88*
CS financial assets share	Mandat1	3.26***	.	1.74*	.	0.70*	.
		4.15		*1 85*		*1 9*	
	Volunt1	1 09	.	-0.44	.	0.21	
		1.43		*-0 64*		*0.63*	
	Mandat2	.	3.39***	.	2.52***	.	0.62**
			4 31		*2 64*		*1 95*
	Volunt2	.	1 23	.	-0.51	.	0 45
			1 45		*-0 67*		*1.24*
Inflation		0.73	0 69	0.71**	0.78**	0.008	-0.006
		1 46	*1 35*	*2.07*	*2 29*	*0.06*	*-0 05*
Real Interest Rate		-0 27	-0 46	-0 53	-0 59	0.55**	0.56**
		-0.29	*-0.49*	*-0 82*	*-0 92*	*2.09*	*2.08*
Real Return on Stock Market Index		0.14*	0.14*	0.14*	0.14*	-0 009	-0.008
		1.81	*1 78*	*1 93*	*1 91*	*-0.33*	*-0.3*
Inflation (volatility)		-0.032***	-0.033***	-0 002	-0 001	0 00004	-3.56E-06
		-3 7	*-3.62*	*-0 25*	*-0.23*	*0.03*	*0*
Real Interest Rate (volatility)		-0 00002	0 0002	0 004	0.004	0.0019**	0.0018**
		-0 01	*0 07*	*1 43*	*1 5*	*2.29*	*2 41*
Real Stock Market Return (volatility)		-1.48**	-1.42**	-0.84	-0.82	0 31	0.32
		-2 03	*-1 95*	*-1 6*	*-1 55*	*1.57*	*1.57*
GDP/capita (constant US $)		9.9E-6*	9 5E-6*	7.03E-06	10 3E-6**	-3.83E-06	-3.79E-06
		1 68	*1.68*	*1.32*	*2 05*	*-1.38*	*-1.4*
Number of Obs.		161	161	160	160	161	161
Number of Groups		28	28	28	28	28	28
Wald Test (joint significance)		3150 88	5636.46	1127 59	1290.71	538.79	809.62
		16	16	16	16	16	16
Test of autocorrelation of order 1		-2 37	-2.36	-1 64	-1.63	-2.72	-2.63
		0.018	*0 018*	*0 102*	*0 104*	*0 007*	*0 009*
Test of autocorrelation of order 2		0.12	0	-1.27	-1.35	-0 02	-0 01
		0 905	*0.990*	*0 202*	*0 176*	*0 988*	*0 994*
Sargan Test		145.36 (127)	147.17 (127)	142 54 (134)	140.14 (134)	42.51 (36)	43 92 (36)
		0.13	*0 11*	*0 29*	*0.34*	*0 21*	*0 17*

One-step estimates are reported.
Standard errors are corrected for heteroschedasticity
Year dummies are included

Notes: * = 10% significance level. ** = 5% significance level. *** = 1% significance level.

Table 9: Impact of Contractual Savings on Capital Markets

(Capital Account – Securities Assets + Liabilities)

First difference dynamic panel data GMM estimator

Dependent Variable:		Stock Market Capitalization (% GDP)	Stock Traded (% GDP)	Total Domestic Bonds (% GDP)
Explanatory Variables (lagged)				
Lagged dependent variable		0.73***	0.62***	0 66***
		7 13	*3.09*	*5.29*
CS financial assets share	High	1.14	-0.76	0.52***
		1 01	*-0.73*	*3.16*
	Low	1 37*	-0.59	-0.16
		1 68	*-0 47*	*-0.39*
Inflation		0.71*	0.75*	0.12
		1.72	*1.9*	*0.78*
Real Interest Rate		0.19	-0.05	0 64***
		0 24	*-0.1*	*2 6*
Real Return on Stock Market Index		0.11	0.12	-0 02
		1 54	*1 68*	*-0.82*
Inflation (volatility)		-0 035***	-0.001	0.001
		-3 95	*-0.18*	*0 61*
Real Interest Rate (volatility)		-0.0006	0 003	0 0015**
		-0.22	*1.02*	*1 98*
Real Stock Market Return (volatility)		-1.27*	-0.68	0.33
		-1.91	*-1 31*	*1 56*
GDP/capita (constant US $)		7.50E-06	1.01E-05	-1 27E-06
		1 33	*1.39*	*-0.75*
Capital Account		0.96*	0.26	0.21
Portfolio Openness		*1 79*	*0.39*	*1*
Number of Obs.		147	146	147
Number of Groups		26	26	26
Wald Test		3816.91	3571.51	711.04
(joint significance)		17	17	17
Test of autocorrelation of order 1		-1.84	-1.44	-2.5
		0 067	*0 150*	*0.012*
Test of autocorrelation of order 2		-0.57	-0.7	0 4
		0 572	*0 485*	*0.692*
Sargan Test		133.21 (128)	126.59 (135)	40.21 (37)
		0 36	*0 69*	*0 33*

One-step estimates are reported.

Standard errors are corrected for heteroschedasticity.

Year dummies are included

Notes: * = 10% significance level. ** = 5% significance level. *** = 1% significance level.

Table 10: Impact of Contractual Saving on Capital Markets (Transparency)
First difference dynamic panel data GMM estimator

Dependent Variable:	Stock Market Capitalization (% GDP)	Stock Traded (% GDP)
Explanatory Variables (lagged)		
Lagged dependent variable	0.69***	0.63***
	7.98	*4 72*
CS financial assets share	-5.18	-7.82*
	-1 36	*-1.66*
CS financial assets share * Accounting Std.	0.09*	0.11*
	1 76	*1 68*
Inflation	0.57	0.54*
	1 12	*1.65*
Real Interest Rate	-0.36	-0.50
	-0.37	*-0 77*
Real Return on Stock Market Index	0.12	0.14*
	1.46	*1.82*
Inflation (volatility)	-0.03***	-0.0002
	-3 81	*-0.03*
Real Interest Rate (volatility)	-0.0005	0.003
	-0 16	*0 98*
Real Stock Market Return (volatility)	-1.30*	-0.88
	-1 64	*-1 48*
GDP/capita (constant US $)	6.94E-06	3.34E-06
	1.16	*0 62*
Number of Obs.	151	150
Number of Groups	25	25
Wald Test (joint significance)	9352.73 16	1169.61 16
Test of autocorrelation of order 1	-2.23	-1.63
	0 02	*0.10*
Test of autocorrelation of order 2	-0.12	-1.28
	0 91	*0 20*
Sargan Test	139.19 (138)	134.36 (135)
	0.24	*0 50*

One-step estimates are reported
Standard errors are corrected for heteroschedasticity
Year dummies are included

Notes: * = 10% significance level. ** = 5% significance level. *** = 1% significance level.

Table 11: Impact of Contractual Savings on Capital Markets

(Decomposition of Contractual Savings)

First difference dynamic panel data GMM estimator

Dependent Variable:		Stock Market Capitalization (% GDP)	Stock Traded (% GDP)	Total Domestic Bonds (% GDP)
Explanatory Variables (lagged)				
Lagged dependent variable		0.58***	0.46***	0.57***
		2.91	*2.43*	*2.78*
CS financial assets share	CSFAhat	1.19	-0.98	-0.53
		0.43	*-0.51*	*-0.73*
	CSFAres	3.03***	1.008	0.61***
		2.47	*1.01*	*3.48*
Inflation		0.03	0.49	-0.04
		0.04	*0.83*	*-0.18*
Real Interest Rate		-1.04	-0.29	0.73
		-0.64	*-0.21*	*1.43*
Real Return on Stock Market Index		0.10	0.10	-0.05***
		1.02	*1.1*	*-2.65*
Inflation (volatility)		0.002	-0.07	0.02
		0.01	*-0.27*	*0.37*
Real Interest Rate (volatility)		0.0002	0.003	0.002*
		0.03	*1.05*	*1.78*
Real Stock Market Return (volatility)		-0.95	-0.24	0.62***
		-1.23	*-0.44*	*4.09*
GDP/capita (constant US $)		2.43E-06	2.30E-06	-8.33E-06
		0.23	*0.2*	*-1.33*
Number of Obs.		106	106	106
Number of Groups		23	23	23
Wald Test (joint significance)		440.8	420.21	493.97
		14	14	14
Test of autocorrelation of order 1		-1.94	-1.67	-1.68
		0.05	*0.09*	*0.0934*
Test of autocorrelation of order 2		0.57	-0.78	0.81
		0.57	*0.43*	*0.418*
Sargan Test		93.19 (98)	84.98 (103)	41.6 (33)
		0.62	*0.90*	*0.14*

One-step estimates are reported

Standard errors are corrected for heteroschedasticity

Year dummies are included

Notes: * = 10% significance level. ** = 5% significance level. *** = 1% significance level.

Policy Research Working Paper Series

	Title	Author	Date	Contact for paper
WPS2923	Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages	Beata K. Smarzynska	October 2002	P Flewitt 32724
WPS2924	Financial Development, Property Rights, and Growth	Stijn Claessens Luc Laeven	November 2002	R Vo 33722
WPS2925	Crime and Local Inequality in South Africa	Gabriel Demombynes Berk Ozler	November 2002	P Sader 33902
WPS2926	Distinguishing between Observationally Equivalent Theories of Crises	Rashmi Shankar	November 2002	P Holt 37707
WPS2927	Military Expenditure: Threats, Aid, and Arms Races	Paul Collier Anke Hoeffler	November 2002	A Kitson-Walters 33712
WPS2928	Growth without Governance	Daniel Kaufmann Aart Kraay	November 2002	K Morgan 37798
WPS2929	Assessing the Impact of Communication Costs on International Trade	Carsten Fink Aaditya Mattoo Ileana Cristina Neagu	November 2002	P Flewitt 32724
WPS2930	Land Rental Markets as an Alternative to Government Reallocation? Equity and Efficiency Considerations in the Chinese Land Tenure System	Klaus Deininger Songqing Jin	November 2002	M. Fernandez 33766
WPS2931	The Impact of Property Rights on Households' Investment, Risk Coping, and Policy Preferences: Evidence from China	Klaus Deininger Songqing Jin	November 2002	M Fernandez 33766
WPS2932	China's Accession to the World Trade Organization The Services Dimension	Aaditya Mattoo	December 2002	P Flewitt 32724
WPS2933	Small- and Medium-Size Enterprise Financing in Eastern Europe	Leora F Klapper Virginia Sarria-Allende Victor Sulla	December 2002	A Yaptenco 31823
WPS2934	After the Big Bang? Obstacles to the Emergence of the Rule of Law in Post-Communist Societies	Karla Hoff Joseph E Stiglitz	December 2002	A Bonfield 31248
WPS2935	Missed Opportunities: Innovation and Resource-Based Growth in Latin America	William F Maloney	December 2002	P Soto 37892
WPS2936	Industrial Ownership and Environmental Performance Evidence from China	Hua Wang Yanhong Jin	December 2002	Y D'Souza 31449
WPS2937	The Determinants of Government Environmental Performance. An Empirical Analysis of Chinese	Hua Wang Wenhua Di	December 2002	Y D'Souza 31449

Policy Research Working Paper Series

	Title	Author	Date	Contact for paper
	Townships			
WPS2938	Recurrent Expenditure Requirements of Capital Projects Estimation for Budget Purposes	Ron Hood David Husband Fei Yu	December 2002	M Galatis 31177
WPS2939	School Attendance and Child Labor in Ecuador	Gladys López-Acevedo	December 2002	M Geller 85155
WPS2940	The Potential Demand for an HIV/ AIDS Vaccine in Brazil	Hillegonda Maria Dutilh Novaes Expedito J. A Luna Moisés Goldbaum Samuel Kilsztajn Anaclaudia Rossbach José de la Rocha Carvalheiro	December 2002	H Sladovich 37698
WPS2941	Income Convergence during the Disintegration of the World Economy, 1919–39	Branko Milanovic	January 2003	P Sader 33902
WPS2942	Why is Son Preference so Persistent in East and South Asia? A Cross-Country Study of China, India, and the Republic of Korea	Monica Das Gupta Jiang Zhenghua Li Bohua Xie Zhenming Woojin Chung Bae Hwa-Ok	January 2003	M. Das Gupta 31983
WPS2943	Capital Flows, Country Risk, and Contagion	Norbert Fiess	January 2003	R Izquierdo 84161
WPS2944	Regulation, Productivity, and Growth. OECD Evidence	Giuseppe Nicoletti Stefano Scarpetta	January 2003	Social Protection Advisory Service 85267
WPS2945	Micro-Finance and Poverty: Evidence Using Panel Data from Bangladesh	Shahidur R. Khandker	January 2003	D. Afzal 36335
WPS2946	Rapid Labor Reallocation with a Stagnant Unemployment Pool: The Puzzle of the Labor Market in Lithuania	Jan Rutkowski	January 2003	J. Rutkowski 84569
WPS2947	Tax Systems in Transition	Pradeep Mitra Nicholas Stern	January 2003	S. Tassew 88212